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Winter food of the Secretarybird as revealed by pellets

by R. K. Brooke & C. J. Hodgson

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No detailed studies of the food of the Secretarybird *Sagittarius serpentarius* south of the equator appear to have been made though there are many scattered observations to the more recent of which we draw attention. Brown & Amadon (1968) say:—

“The staple food is small ground mammals and large insects, with some young birds, eggs and lizards, snakes and larger creatures up to the size of a young hare. . . . All prey is taken on the ground”.

Our studies and the miscellaneous observations reported below support this general statement (subject to clarification of ‘large’) which we prefer to that of McLachlan & Liversidge (1970) (repeated from their 1957 work) who say:—

“Insects including termites, wasps and their larvae, snakes, tortoises, young birds and any small animals it can kill”.

Problems in the diet of Secretarybirds can be broken down into (a) what constitutes the soup fed by regurgitation to newly hatched nestlings (Brown 1955, Karmali & Karmali 1968); (b) what is brought in solid form to older nestlings; (c) what adults take for their own consumption, with or without seasonal or geographical variation. This paper draws together recently published data on food items, some unpublished data and the results of our study of pellets collected below winter roosts.

Van Someren (1956), writing about Kenya, gives the diet as snakes, lizards, rats, locusts, grasshoppers, beetles, nestling birds, cheepers, plovers’ eggs and saturniid moth larvae scorched by veld fires. Brown (1955) reports that in Kenya regurgitated prey for the young includes mice, shrews, rats, a lizard, a hedgehog and many large grasshoppers. He adds that snakes and mammals are brought to the incubating female by her mate. Steyn (1961) in Rhodesia found on one visit to a nest ten lizards, one mouse and a young hare. More generally he adds snakes and francolins *Francolinus* spp. He also remarks “Almost all pellets opened contained the remains of locusts and these appeared to be a consistent part of their diet”. It is not clear whether his pellets were regurgitated by adults or nestlings. The late K. W. Greenhow whose notebooks are in the National Museums of Rhodesia in Bulawayo (c.f. Vernon 1967) and who worked in Rhodesia commented on a nest found at Headlands on 19 December 1948 containing two eggs:—

"Scattered about the rim were numerous large castings of matted mouse hair, small bones, scales (snakes?) and locusts legs. These pellets were some two inches long and cylindrical".

He also found pellets containing rodent fur and insect remains at Stapleford on 5 November. The late W. Krienke whose notebook dealing largely with eggs collected is in the Queen Victoria Museum in Salisbury found a nest of the Secretarybird near Beatrice on 24 July 1929 containing one nestling which he estimated to be a month old. Lying in the nest were a Yellow-billed Hornbill *Tockus flavirostris* and a black cobra *Naja* sp. Editor (1968) tells us that a Secretarybird on a golf course at De Aar in the northern Cape Province of South Africa ate a driven golf ball in July: an interesting pellet must have resulted. He adds that to a nest with young were brought various rodents, a lizard, a snake, large grasshoppers and a clutch of francolin eggs, all regurgitated whole. P. le S. Milstein (*in litt.* to R.K.B.) advises that he has found unidentified egg shells in Secretarybird pellets, and seen them take eggs of Helmeted Guineafowl *Numida meleagris* on several occasions, and at Allemanskraal in the Orange Free State the clutch of four of an Orange River Francolin *Francolinus levaillantoides*. Allen & Ansell (1966) record that a juvenile in captivity at Chipata in Zambia ate freely of rodents, dead snakes, strips of game meat and of Helmeted Guineafowl, but refused strips of meat of domestic stock from the butcher and also large Orthoptera. It was not seen to drink water which was always available. McLachlan & Liversidge (1970) include wasps and their larvae. This is based on Roberts (1940) who adds that these are from paper nests in trees and bushes. However this is not usual practice and should not have been included in a general statement without qualification.

In the Salisbury district of Rhodesia Secretarybirds are inclined to roost gregariously (up to five birds in one tree) in isolated large Acacias in grassland in winter. The Rhodesian breeding season is May to March with a peak in October (Rhodesian Ornithological Society nest record card collection). While roosting they regurgitate pellets which can be collected from the ground below. As noted by Greenhow quoted above these pellets are cylindrical and look like the object held in the bill of an adult photographed by Karmali & Karmali (1968). They vary greatly in length from c.30 to c.100 mm but the diameter varies little: four selected as apparent extremes vary 41-45 mm. Weight also varies, probably in proportion to the length: the heaviest weight noted for a furry pellet was 20 g. It is not known how often pellets are regurgitated or how long after consumption of the prey. Pellets were collected by R. K. B. on 13 June 1963, 2 August 1964, 4 June 1965, 12 August 1966, 17 October 1966, the last after the winter roost had been abandoned.

C. J. H., then of the Entomological Section of the Ministry of Agriculture, examined and analysed the pellets. The great majority of the pellets were basically composed of mammalian fur. These were broken up and dropped into a concentrated solution of magnesium sulphate. This resulted in all the invertebrate remains and most of the fur floating to the surface while nearly all the bones and teeth sank to the bottom. The pellets of June 1963 were analysed in greater detail since they eventually proved to be an unusual collection, the results of which may be summarized:—

(1) Five grassy pellets

(i) Many mandibles of various Orthoptera were found. A count was made of the number in these pellets. Fifty were found, suggesting that

at least 25 large grasshoppers (Catantopidae) had been eaten. As far as could be determined these belonged to the genera *Catantops*, *Cyrtocanthacris* and *Acanthacris*. There were also signs that other large grasshoppers and crickets were taken. Apart from the mandibles, portions of the jumping legs, the elytra, hind wings and the pronotum were noticeable.

(ii) Another insect group which appeared commonly was the Coleoptera: mostly Staphylinidae (subfamily Hybosorinae and Orphninae) with almost as many Tenebrionidae. A few Curculionidae were also found. The remains were from almost any part of the body as this order is very heavily sclerotized.

(iii) Occasional Hemiptera were found: large members of the Pentatomidae, Coreidae and Reduviidae. The undigested portion was made up almost entirely of head capsules and thoraxes.

(iv) Other insect groups found were Isoptera: mostly workers, and Hymenoptera (Formicidae: mostly Dorylinae). All that remained of these was the thorax.

(v) There were portions of sclerotized material which might have been part of large millipedes, but this is uncertain.

(vi) The lower jaws of some minute mammals were present. These appeared to be vole like, with a lower jaw of no more than $\frac{1}{4}$ inch long, so they must have been very small—perhaps they were immatures.

(vii) In some pellets there were a few stones, never exceeding one-fifth inch long and comprising never more than 0.5 % of a pellet.

(viii) The rest (about half) of these pellets were made up of plant material which appeared to be nearly all grass, though seeds of some other plants were noted. Practically all the material was too large to have come from the guts of Orthoptera eaten by the Secretarybirds.

(2) Six fur pellets

(i) These were composed of fur to the extent of 95 % of their volume. The fur was often long: an occasional tuft of an inch or more in length being found. The bony portions were made up of lower jaws which were all incomplete, and occasional vertebrae. The remains suggested that the jaws may have been $\frac{3}{4}$ inch long and contained teeth which were mainly of a herbivorous type. The bones probably belonged to rodents of the subfamily Otomyinae which occur freely round Salisbury.

(ii) Occasional insect remains were found, but they made up less than 1 % of the volume of the pellets.

(iii) The scales of at least one, and probably more than one snake were found.

(3) Mixed pellets

(i) These never had more than 20 % fur.

(ii) A few mammalian jaw remains were found.

(iii) A high percentage of plant matter occurred similar to (1) (viii) above.

These pellets show that while the substantial part of the diet had been small rodents, almost as much insect material and grass had been eaten. The five pellets consisting mostly of plant material also contained large numbers of larger grasshoppers and beetles, along with a variety of other insects, whereas this was not true of the fur pellets. P. Steyn (*in litt.* to R.K.B.) has found substantial grasshopper remains in fur pellets in a nest at Essexvale on 30 December.

There is no suggestion in the literature that the Secretarybird eats grass or other plant material as opposed to using tufts of grass for nest lining. It should be noted that all the stones were found in grass pellets and it is possible that they assist its essentially flesh-eating gizzard to extract nourishment from grass. It is well known that most gallinaceous birds, waterfowl and the Ostrich *Struthio camelus* take grit and small stones to help the gizzard break up their vegetable diet. But equally the grass may have been ingested to form the binding for pellets deficient in the normal binding of mammalian fur, though in this case the presence of stones is not explained except perhaps as an assistance in breaking up the harder exoskeletons of large invertebrates. C. J. Vernon (*in litt.* to R.K.B.) has found plenty of grass and seeds in pellets of the Barn Owl *Tyto alba* in southern Africa. This is almost invariably correlated with the presence of bones and teeth of the Pouched Mouse *Saccostomus campestris* in the pellets. But we have not been able to prove that this rodent is eaten by the Secretarybirds though it is likely enough. Neither does eating Pouched Mice explain the vegetable matter in pellets containing no mammalian fur. As noted above the grass remains were in many instances too large to have come from the gut of any orthopteran.

There were remarkably few remains of bones in furry pellets considering the quantity of fur present. This suggests that the digestive system of the Secretarybird is more destructive than in, say, the Barn Owl, though less so than in the Grey Heron *Ardea cinerea* (P. le S. Milstein *in litt.* to R.K.B.). This might explain the absence of any reptilian remains apart from a few snake scales even though lizards which are common around Salisbury are probably freely eaten (c.f. Steyn 1961, Brown & Amadon 1968).

Thereafter no truly grassy pellets were found which suggests that there was some special reason for Secretarybirds to eat grass in June 1963. Fur pellets continued to show a poverty of bones and teeth. The following additional items of food were found:—

Chelicera of a spider; a millipede; scorpions *Opisthophthalmus* sp., probably *O. carinatus* (Peters) (Dr. R. F. Lawrence *in litt.* to R.K.B.); Coleoptera—carapaces of *Renatiella* sp., Scarabaeidae and *Brachycercus congestus* Gerst; a few seeds including two maize pips; a few lizard or snake scales; grit; remains of grasshoppers (Acrididae), usually hind femurs over 20 mm long, hind wings, tibia and tarsus heads, mandibles and elytra.

In June 1963 a long, headless snake about three-quarters eaten was found caught up in a wild Asparagus bush below the roost.

It appears that insects, sometimes quite small ones like termite workers, are far more freely taken than the literature suggests (summarized in Brown & Amadon 1968) and that, as those authors point out, snakes are not a major aspect of their diet in point of numbers as opposed to bulk. The ingestion of grass requires further study. The normal problem in deducing diet from pellets, differential capability and rate of digestion of different prey items, is particularly acute in a species with as powerful a digestion as the Secretarybird appears to have.

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The American Pectoral Sandpiper in Africa

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The American Pectoral Sandpiper *Calidris melanotos* (Vieillot) is a rare winter visitor to Africa. It has been collected at Lake Naivasha in Kenya on 11 May 1952 (Williams 1952) and at Rondevlei, Cape Town in South Africa on 25 March 1965 in company with the Little Stint *C. minuta* (Leisler) (Middlemiss 1965). There are a few published sight records: Oulidia on the coast of Morocco on 22 and 23 September 1963 in company with Dunlin *C. alpina* (L.) and Curlew Sandpipers *C. ferruginea* (Pontoppidan) (Smith 1964); near Casablanca, also on the coast of Morocco, on 1 October 1963 in company with Ruff *Philomachus pugnax* (L.) (Smith 1964); Heany in Rhodesia from 2 to 4 April 1949 (Editor 1949); Bathurst District on the coast of the eastern Cape Province of South Africa in company with Little Stints and Curlew Sandpipers on 3 and 24 April and on 1 May 1966, and with Ruff and Wood Sandpipers *Tringa glareola* L. on 3 December 1967 (Tree 1966, 1971).

P. J. G. G. obtained a female in fresh nuptial plumage on 25 April 1971 at Toromoja (quarter degree square 2124BI) on the Botletle River in Botswana. It was in a flock of c.10 Curlew Sandpipers on the river bank of which a male in winter plumage was also collected. The American Pectoral Sandpiper was collected as it was believed, in view of its straight bill, to be a Reeve. However upon examination it was realised that this was not the case. A study of Ridgway (1919) and of Witherby *et al.* (1943) shows that in fact an American Pectoral Sandpiper was collected. The critical points are: white shaft of the outermost primary; outer four pairs of rectrices of virtually equal length and the two inner pairs substantially longer, particularly the central pair (distance between tips of the four outer pairs and the innermost pair when the tail is held closed 9.5 mm); the eyestripe is not well developed and does not extend behind the eye; breast feathers dull dark brown broadly edged with pinkish buff; no fulvous on the flanks. All these characters show that our specimen is not the Siberian Pectoral Sandpiper *C. acuminata* (Horsfield) which despite its more westerly breeding range has not been taken in Africa. Our specimen has a right wing of 128, left wing 129.5, culmen (exposed) 25, tail 63, tarsus